

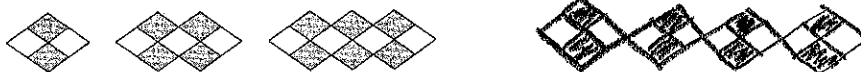
# 2-1

## Skills Practice

### Inductive Reasoning and Conjecture

Make a conjecture about the next item in each sequence.

1.



2.  $-4, -1, 2, 5, 8$  11

+3

3.  $6, \frac{11}{2}, 5, \frac{9}{2}, 4$   $\frac{7}{2}$

$\frac{12}{2}$

$\frac{10}{2}$

$\frac{8}{2}$

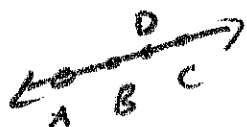
$\frac{6}{2}$

4.  $-2, 4, -8, 16, -32$  64

$\times -2$

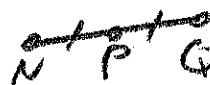
Make a conjecture based on the given information. Draw a figure to illustrate your conjecture.

5. Points A, B, and C are collinear, and D is between B and C.



A, B, C, and D are collinear.

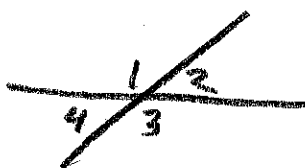
6. Point P is the midpoint of  $\overline{NQ}$ .



$NP = PQ$   
or  $\overline{NP} \cong \overline{PQ}$

~~7.  $\angle 1, \angle 2, \angle 3$ , and  $\angle 4$  form four linear pairs.~~

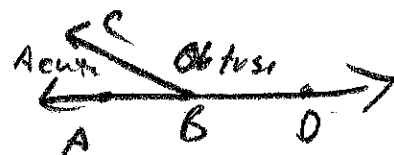
~~8.  $\angle 3 \cong \angle 4$~~



Determine whether each conjecture is true or false. Give a counterexample for any false conjecture.

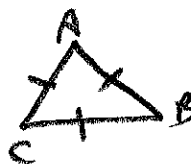
9. Given:  $\angle ABC$  and  $\angle CBD$  form a linear pair.  
Conjecture:  $\angle ABC \cong \angle CBD$

False



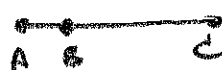
10. Given:  $\overline{AB}$ ,  $\overline{BC}$ , and  $\overline{AC}$  are congruent.  
Conjecture: A, B, and C are collinear.

False



11. Given:  $AB + BC = AC$   
Conjecture:  $AB = BC$

False



$AB \neq BC$

12. Given:  $\angle 1$  is complementary to  $\angle 2$ , and  $\angle 1$  is complementary to  $\angle 3$ .  
Conjecture:  $\angle 2 \cong \angle 3$

True

# 2-2 Skills Practice

## Logic

Use the following statements to write a compound statement for each conjunction and disjunction. Then find its truth value.

$\overline{T}$   $p: -3 - 2 = -5$

$\overline{T}$   $q: \text{Vertical angles are congruent.}$

$\overline{F}$   $r: 2 + 8 > 10$

$\overline{T}$   $s: \text{The sum of the measures of complementary angles is } 90^\circ.$

1.  $p \text{ and } q$   $\overline{T}$

2.  $p \wedge r$   $\overline{F}$

3.  $p \text{ or } s$   $\overline{T}$

4.  $r \vee s$   $\overline{T}$

5.  $p \wedge \sim q$   $\overline{F}$

6.  $q \vee \sim r$   $\overline{T}$

Copy and complete each truth table.

7.

$p$	$q$	$\sim p$	$\sim p \wedge q$	$\sim(\sim p \wedge q)$
T	T	$\overline{F}$	$\overline{F}$	$\overline{T}$
T	F	$\overline{F}$	$\overline{F}$	$\overline{T}$
F	T	$\overline{T}$	$\overline{T}$	$\overline{F}$
F	F	$\overline{T}$	$\overline{F}$	$\overline{T}$

8.

$p$	$q$	$\sim q$	$p \vee \sim q$
T	T	$\overline{F}$	$\overline{T}$
T	F	$\overline{T}$	$\overline{T}$
F	T	$\overline{F}$	$\overline{F}$
F	F	$\overline{T}$	$\overline{T}$

Construct a truth table for each compound statement.

9.  $\sim q \wedge r$

$q$	$r$	$\sim q$	$\sim q \wedge r$
$\overline{T}$	$\overline{T}$	$\overline{F}$	$\overline{F}$
$\overline{T}$	$\overline{F}$	$\overline{F}$	$\overline{F}$
$\overline{F}$	$\overline{T}$	$\overline{T}$	$\overline{T}$
$\overline{F}$	$\overline{F}$	$\overline{T}$	$\overline{F}$

10.  $\sim p \vee \sim r$

$p$	$r$	$\sim p$	$\sim r$	$\sim p \vee \sim r$
$\overline{T}$	$\overline{T}$	$\overline{F}$	$\overline{F}$	$\overline{F}$
$\overline{T}$	$\overline{F}$	$\overline{F}$	$\overline{T}$	$\overline{T}$
$\overline{F}$	$\overline{T}$	$\overline{T}$	$\overline{F}$	$\overline{T}$
$\overline{F}$	$\overline{F}$	$\overline{T}$	$\overline{T}$	$\overline{T}$

## 2-2 Practice

### Logic

Use the following statements to write a compound statement for each conjunction and disjunction. Then find its truth value.

$\begin{matrix} T \\ T \\ F \end{matrix}$   $p$ : 60 seconds = 1 minute

$\begin{matrix} T \\ T \\ F \end{matrix}$   $q$ : Congruent supplementary angles each have a measure of 90.

$\begin{matrix} T \\ T \\ F \end{matrix}$   $r$ :  $-12 + 11 < -1$

1.  $p \wedge q$  **T**

2.  $q \vee r$  **T**

3.  $\sim p \vee q$  **T**

4.  $\sim p \wedge \sim r$  **F**

Copy and complete each truth table.

5.

$p$	$q$	$\sim p$	$\sim q$	$\sim p \vee \sim q$
T	T	F	F	F
T	F	F	T	T
F	T	T	F	T
F	F	T	T	T

6.

$p$	$q$	$\sim p$	$\sim p \vee q$	$p \wedge (\sim p \vee q)$
T	T	F	T	T
T	F	F	F	F
F	T	T	T	F
F	F	T	T	F

Construct a truth table for each compound statement.

7.  $q \vee (p \wedge \sim q)$

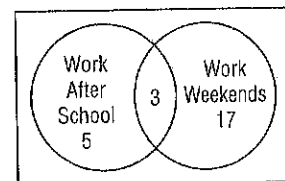
$p$	$q$	$\sim q$	$p \wedge \sim q$	$q \vee (p \wedge \sim q)$
T	T	F	F	T
T	F	T	T	T
F	T	F	F	T
F	F	T	F	F

8.  $\sim q \wedge (\sim p \vee q)$

$p$	$q$	$\sim p$	$\sim q$	$\sim p \vee q$	$\sim q \wedge (\sim p \vee q)$
T	T	F	F	T	F
T	F	F	T	F	F
F	T	T	F	T	F
F	F	T	T	T	T

**SCHOOL** For Exercises 9 and 10, use the following information.

The Venn diagram shows the number of students in the band who work after school or on the weekends.



9. How many students work after school and on weekends? **3**

10. How many students work after school or on weekends? **25**

## 2-3 Skills Practice

### Conditional Statements

Identify the hypothesis and conclusion of each statement.

1. If you purchase a computer and do not like it, then you can return it within 30 days.

2. If  $x + 8 = 4$ , then  $x = -4$ .

3. If the drama class raises \$2000, then they will go on tour.

Write each statement in if-then form.

4. A polygon with four sides is a quadrilateral.

If a polygon has 4 sides, then it is a quadrilateral.

5. "Those who stand for nothing fall for anything." (Alexander Hamilton)

If you stand for nothing, then you will fall for anything.

~~6. An acute angle has a measure less than 90.~~

#### Exercises

Write the converse, inverse, and contrapositive of each conditional statement. Tell which statements are *true* and which statements are *false*. Provide counterexample.

True

1. If you live in San Diego, then you live in California.

Converse: If you live in CA, then you live in San Diego.

False (Los Angeles)

Inverse: If you don't live in San Diego, then you don't

False (Los Angeles) live in CA.

True

Contrapositive: If you don't live in CA, then you don't live in San Diego.

**2-4 Skills Practice****Deductive Reasoning**

Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

*If the sum of the measures of two angles is 180, then the angles are supplementary.*

1. Given:  $m\angle A + m\angle B$  is 180.

Conclusion:  $\angle A$  and  $\angle B$  are supplementary.

Valid (Law of Detachment)

2. Given:  $m\angle ABC$  is 95 and  $m\angle DEF$  is 90.

Conclusion:  $\angle ABC$  and  $\angle DEF$  are supplementary.

Invalid  $\neq 180$

3. Given:  $\angle 1$  and  $\angle 2$  are a linear pair.

Conclusion:  $\angle 1$  and  $\angle 2$  are supplementary.

Valid Linear pair totals 180

Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements. If a valid conclusion is possible, write it.

4. If two angles are complementary, then the sum of their measures is 90.

If the sum of the measures of two angles is 90, then both of the angles are acute.

If 2  $\angle$ s are complementary, then both of the angles are acute.

5. If the heat wave continues, then air conditioning will be used more frequently.

If air conditioning is used more frequently, then energy costs will be higher.

If the heat wave continues, then energy costs will be higher.

Determine whether statement (3) follows from statements (1) and (2) by the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If it does not, write *invalid*.

6. (1) If it is Tuesday, then Marla tutors chemistry.

(2) If Marla tutors chemistry, then she arrives home at 4 P.M.

(3) If Marla arrives at home at 4 P.M., then it is Tuesday.

Invalid

7. (1) If a marine animal is a starfish, then it lives in the intertidal zone of the ocean.

(2) The intertidal zone is the least stable of the ocean zones.

(3) If a marine animal is a starfish, then it lives in the least stable of the ocean zones.

Valid; Law of Syllogism